# D E C L A R A T I O N

I, YUZURU OKABE, a Japanese Patent Attorney registered No. 9411 of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the application documents of Japanese Patent Application No. 4-186357 filed on June 19, 1992 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 3rd day of October, 1995

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PATENT OFFICE
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[TITLE OF THE INVENTION]

Printer Controlling Method and Controlling System Thereby

[PATENT CLAIMS]

[Claim 1]

A printer controlling method, characterized in that printer control language data stored in a memory of a printer which is connected to a host computor via a bidirectional interface is acquired, switching of printer drivers is designated based on said printer control language data thus acquired, and a printer driver environment of said host computor is set conformably in accordance with the switching designation.

[Claim 2]

A printer controlling system of the type consisting of printers which are connected to a host computor via a bidirectional interface, characterized in that it comprises first acquiring means for acquiring printer control language data stored in a memory of a printer which is connected to said host computor via a bidirectional interface, designating means for analyzing said printer control language data

acquired by said first acquiring means to designate the switching of printer drivers, and environment setting means for setting conformably a printer driver environment of said host computor in accordance with the switching designation by said designating means.

[Claim 3]

A printer controlling method, characterized in that first printer environment data which is stored in a memory of a printer which is connected to a host computor via a bidirectional interface is acquired based on a printer environment switching state, said first printer environment data thus acquired is registed as an internal file within said host computor, second printer environment data corresponding to a second printer environment is set in said memory at the completion of the registration, and said first printer environment data which is registered in said internal file is recovered and set in said memory based on a printing process terminating status corresponding to said second printer environment.

[Claim 4]

A printer controlling method as defined in claim 3, wherein the switching of printer environments occurs in association with the switching of printer control language systems.

[Claim 5]

A printer controlling system of the type

consisting of printers which are connected to a host computor via a bidirectional interface, characterized in that it comprises second acquiring means for acquiring first printer environment data stored in a memory based on a printer environment switching state, registering means for registering said first printer environment data acquired by said second acquiring means as an internal file of said host computor, and environment setting controlling means for setting second printer environment data corresponding to a second printer environment in said memory after said data has been registered by said registering means and recovering and setting said first printer environment data registered in said internal file based on a printing process termination state corresponding to said second printer environment in said memory.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Field of Industrial Utilization]

The present invention relates to a printer system consisting of printers which are connected to a host computor via a bidirectional interface and more particularly to printer controlling method and controlling system thereby in which the host computor controls setting of a printer environment.

[0002]

[Prior Art]

Recently, a recording apparatus or recording system which is capable of executing the processings as mentioned above has been constructed by a printer which is connected to a host computer through an interface (e.g., a Centronics interface) analyzes input data from the host computer and develops bit-map data as output data of, e.g., a laser beam printer. The printer then scan-exposes a photosensitive drum with a laser beam modulated on the basis of this developed data, thereby recording an image.

[0003]

In the case of a printer with an emulation function, a plurality of printer control language systems can be processed; the printer can execute printing while switching an emulation mode and a native mode in accordance with application programs that a user executes. The printer of this type has switches for switching printer control languages and card slots for giving switching designation.

[0004]

[Problems to be Solved by the Invention]

The printer of the above type, however, has no function of checking compatibility of a language environment, which is preset in the printer, before starting printing. Therefore, if printing is started

by transferring print data to the printer notwithstanding that the language environment preset in the printer differs from the language environment that an application has set, unexpected results are printed.
[0005]

As described above, under a print system environment in which printer control languages are selectively used (i.e., an environment in which a plurality of printer drivers can be selectively executed) in a printer controlling system, a printer control language to be used is determined in accordance with a hardware environment set by a user. Therefore, if the printer control language environments of a host computer and a printer do not match each other, a printing failure occurs because there is no relieving means for obtaining matching. When the printer is located apart from the host computer and print data with a large number of pages is processed, a user does not notice the situation at once, resulting in a serious problem of waste of a paper resource due to unnecessary printing.
[0006]

In addition, in switching between the language environments as described above, if a memory environment is freed, the contents (forms, user fonts, and the memory setting of a RAM) set in a memory of a printer are erased by rewriting. Therefore, even when

the same language environment is selected again, not only the information about the forms, the user fonts, and the like but the memory map of the RAM cannot be reproduced correctly. This makes it impossible to ensure the printing under the environmental status before the switching.

[0007]

If, on the other hand, the memory environment is controlled in such a manner as to keep the status before the language environments are switched, a memory space usable after the switching is rather limited. This significantly decreases the recording efficiency in the environment after the switching.

[0008]

The present invention has been made to solve the above problems, and has as its object to provide printer controlling method and controlling system thereby capable of determining matching in environmental setting status between a host computor and a printer and automatically selecting on the host computor side a printer driver which is compatible to the printer control language data of the printer, thereby obtaining the matching in environment between the host computor and the printer which are nonnected to allow communication and to provide printer controlling method and controlling system thereby capable of managing registration of printer environment

information set in a memory of a printer by monitoring the environment switching status between the host computor and the printer, thereby allowing the host computor to manage the printer environment for each language that is set once with good reproducibility with respect to the printer.

[0009]

[Means for Solving the Problems]

In a first printer controlling method according to the present invention, printer controlling language data stored in a memory of a printer which is connected to a host computor via a bidirectional interface is acquired, switching of printer drivers is designated based on the printer controlling language data thus acquired, and a host computor printer driver environment is conformably set in accordance with the switching designation.

[0010]

In a first printer controlling system according to the present invention, of the type consisting of printers which are connected to a host computor via a bidirectional interface, there are provided first acquiring means for acquiring printer controlling language data stored in a memory of the printer which is connected to the host computor via the bidirectional interface, designating means for analyzing the printer controlling language data acquired by the first

acquiring means to designate switching of printer drivers, and environment setting means for conformably setting a printer driver environment of the host computor in accordance with the switching designation by the designating means.

[0011]

In a second printer controlling method according to the present invention, first printer environment data which is stored in a memory of a printer which is connected to a host computor via a bidirectional interface is acquired based on a printer environment switching state, the first printer environment data thus acquired is registered in an internal file of the host computor, second printer environment data corresponding to a second printer environment is set in the memory at the completion of the data registration, and the first printer environment data registered in the internal file is recovered and set in the memory based on a printing process termination state corresponding to the second printer environment.

[0012]

The switching of printer environments occurs in association with the switching of printer controlling language systems.

[0013]

In a second printer controlling system

according to the present invention, there are provided second acquiring means for acquiring first printer environment data stored in a memory of a printer based on a printer environment switching state, registering means for registering the first printer environment data acquired by the second acquiring means in an internal file of a host computor, and environment setting controlling means for setting second printer environment data corresponding to a second printer environment in the memory after the data has been registered by the registering means and for conformably setting the first printer environment data registered in the internal file in the memory based on a printing process termination state corresponding to the second printer environment.

[0014]

[Operation]

In the first printer controlling method according to the present invention, printer controlling language data stored in the memory of the printer connected to the host computor via the bidirectional interface is acquired, the switching of printer drivers is designated based on the printer controlling language data and the printer driver environment of the host computor is conformably set in accordance with the switching designation, by which even if the printer environments of the printer which is connected

communicably and of the host computor do not conform with each other, printer environments which are conformable with each other can be set to automatically select an optimum printer driver.

[0015]

In the first printer controlling system according to the present invention, when the first acquiring means acquires the printer controlling language data stored in the memory of the printer which is connected to the host computor via the bidirectional interface at a predetermined timing, the designating means analizes the printer controlling language data thus acquired to designate the switching of the printer drivers and the environment setting means conformably sets the printer driver environment of the host computor in accordance with the switching designation, by which even if printer environments of the printer which is connected communicably and of the host computor do not conform with each other, the printer environments which are conformable with each other can be automatically set.

[0016]

In the second printer controlling method according to the present invention, the first printer environment data stored in the memory of the printer which is connected to the host computor via the bidirectional interface is acquired based on the

printer environment switching state, the first printer environment data is registered in the internal file of the host computor, the second printer environment data corresponding to the second printer environment is set in the memory at the completion of the data registration and the first printer environment data registered in the internal file is recovered and set in the memory of the printer based on the printing process termination state corresonding to the second printer language, by which a memory setting state in each environment which varies in association with the switching of printer environments can be surely reproduced.

[0017]

In addition, the switching of the printer environments occurs in association with the switching of the printer controlling language systems, by which a memory setting state in each environment which varies in association with the switching of the printer controlling language systems can be surely reproduced.

[0018]

In the second printer controlling system according to the present invention, when the second acquiring means acquires the first printer environment data stored in the memory, the registering means registers the first printer environment data thus acquired in the internal file of the host computor and

the environment setting controlling means sets the second printer environment data corresponding to the second printer environment in the memory after the data has been registered by the registering means and recovers and sets the first printer environment data registered in the internal file based on the printing process termination state corresponding to the second printer environment in the memory, by which even if the printer languages are frequently switched, the contents of data in the memory in each environment can be recovered and set with high reproducibility.

[0019]

[Embodiment]

Before an explanation of the arrangement of this embodiment, the arrangements of a laser beam printer and an ink jet printer suitable for this embodiment will be described below with reference to Figs. 1 to 3. Note that a printer to which this embodiment is applied is not limited to the laser beam printer and the ink jet printer but may be a printer of another printing system.

[0020]

Fig. 1 is a sectional view showing the arrangement of a first recording appararatus, for example, a laser beam printer (LBP), to which the present invention is applicable.

[0021]

Referring to Fig. 1, an LBP main body or printer 1500 receives and stores print information (e.g., character codes), form information, or macro instructions supplied from an externally connected host computer. The LBP main body 1500 forms character patterns or form patterns corresponding to the input information and forms images on recording paper as a recording medium. The LBP main body 1500 includes an operation panel 1501, on which switches and LED indicators for operations are arranged, and a printer control unit 1000 for controlling the overall LBP main body 1500 and analyzing character information and the like supplied from the host computer. The printer control unit 1000 primarily converts character information into a video signal with the corresponding character pattern and applies the signal to a laser driver 1502. The laser driver 1502 is a circuit for driving a semiconductor laser 1503; the laser driver 1502 switches on and off a laser beam 1504 emitted from the semiconductor laser 1503 in accordance with the input video signal. The laser beam 1504 scan-exposes an electrostatic drum 1506 while being oscillated sideways by a rotary polygon mirror 1505. As a result, an electrostatic latent image of the character pattern is formed on the electrostatic drum 1506. This latent image is developed by a developing unit 1507 arranged

around the electrostatic drum 1506 and transferred onto recording paper. Cut sheets are used as the recording paper, and these cut sheets are housed in a paper cassette 1508 attached to the LBP main body 1500. The cut sheets are fed into the printer and supplied to the electrostatic drum 1506 by a paper supply roller 1509 and paper feed rollers 1510 and 1511. The LBP main body 1500 also has at least one card slot (not shown) through which optional cards and control cards (emulation cards) for different language systems can be connected and used, in addition to internally stored fonts.

[0022]

Fig. 2 is a perspective view showing the outer appearance of a second recording apparatus, for example, an ink jet recording apparatus (IJRA), to which the present invention is applicable.

[0023]

Referring to Fig. 2, a carriage HC engaging with a spiral groove 5004 of a lead screw 5005 which is rotated in association with the forward and backward rotations of a drive motor 5013 via driving force transmission gears 5011 and 5009 has a pin (not shown) and is therefore reciprocated in directions indicated by arrows a and b. An ink jet cartridge IJC is mounted on the carriage HC. A paper holding plate 5002 urges paper against a platen 5000 over the full width in the

carriage moving direction. Photocouplers 5007 and 5008 function as home position detecting means for checking the presence of a lever 5006 of the carriage in this area and performing switching between the rotational directions of the motor 5013. A support member 5016 supports a cap member 5022 for capping the entire surface of a recording head, and a sucking means 5015 for sucking the interior of the cap to perform suction-recovery for the recording head through an opening 5023 inside the cap. A cleaning blade 5017 can be moved forward and backward by a member 5019. A main body support plate 5018 supports the members 5017 and 5019. A lever 5012 for starting suction of the suction-recovery moves in association with the movement of a cam 5020 which engages with the carriage, controlling the driving force from the drive motor through a known transmitting means, such as clutch switching.

[0024]

The apparatus is arranged such that capping, cleaning, and suction-recovery can be performed at their respective positions by the action of the lead screw 5005 when the carriage moves to an area on the home position side; that is, a desired operation need only be performed at a timing known to those skilled in the art.

[0025]

Fig. 3 is a block diagram for explaining the control system of the second recording apparatus shown in Fig. 2.

[0026]

Referring to Fig. 3, this control system includes an interface 1700 for applying recording signals, an MPU 1701, a program ROM 1702 for storing, e.g., control programs to be executed by the MPU 1701, and a DRAM 1703 for storing various data (such as the recording signals and recording data to be supplied to a head). A gate array 1704 controls the supply of the recording data to a recording head 1708 and also controls the transfer of data between the interface 1700, the MPU 1701, and the DRAM 1703. A carriage motor 1710 carries the recording head 1708, and a paper feed motor 1709 feeds recording paper. A head driver 1705 drives the recording head, a motor driver 1706 drives the paper feed motor 1709, and a motor driver 1707 drives the carriage motor 1710.

[0027]

In the recording apparatus with the above arrangement, when a recording signal is applied from a host computer through the interface 1700, this recording signal is converted into recording data for printing by the gate array 1704 and the MPU 1701. Then the motor drivers 1706 and 1707 are driven, and the

recording head is also driven by the recording data supplied to the head driver 1705, thereby executing printing.

[0028]

The MPU 1701 can perform communications with the host computer through the interface 1700; the MPU 1701 can inform the host computer 100 of memory information related to the DRAM 1703 and resource data and can also communicate with a printer connected to the host computer 100 (which will be described later) to automatically determine the environmental setting status of that printer, thereby automatically setting printer environments matching each other.

[0029]

The MPU 1701 can also transfer data set in the memory of the printer to the host computer 100, as a temporary registration file, when switching is performed between printer control languages. When printing is finished after the switching between the printer control languages, the MPU 1701 transfers the temporary registration file back to the printer to reset the data, thereby restoring the printer environment of the printer.

[1st Embodiment]

Fig. 4 is a block diagram for explaining the arrangement of a printer control system according to the first embodiment of the present invention. The

first embodiment will be described below by taking the laser beam printer (Fig. 1) as an example. Note that the present invention can be applied to any of a single apparatus, a system comprising a plurality of apparatuses, and a system in which processing is executed via a network, such as a LAN, provided that the functions of the present invention are executed.

[0030]

Referring to Fig. 4, the host computer 100 has a CPU 1 for executing processing for documents consisting of graphics, images, characters, tables (including spreadsheets), and the like on the basis of document processing programs stored in a ROM 2. The CPU 1 controls individual devices connected to a system bus 4.

[0031]

The ROM 2 stores the control programs of the CPU 1 shown in the flow charts of Figs. 6 and 9. A RAM 3 serves as a main memory and a work area for the CPU 1. A keyboard controller (KBC) 5 controls key inputs from a keyboard 9. A CRT controller (CRTC) 6 controls a display on a CRT display (CRT) 10. A disk controller (DKC) 7 controls access to a hard disk (HD) 11 and a floppy disk (FD) 12 which store boot programs, various applications, font data, user files, edit files, and the like. A printer controller (PRTC) 8 is connected to the printer 1500 through a predetermined

bidirectional interface (interface) 13 and executes processing for controlling communications with the printer 1500. Interface circuits 8a and 18a control command communication processing and recording information processing executed between the printer 1500 and the host computer 100 through the interface 13.

[0032]

The CPU 1 executes processing for developing (rasterizing) an outline font into a display information RAM set in the RAM 3, allowing WYSIWYG on the CRT 10. The CPU 1 also opens various registered windows on the basis of commands designated by a mouse cursor or the like on the CRT 10, executing various tasks of data processing.

[0033]

In the printer 1500, a printer CPU 14 systematically controls access to various devices connected to a system bus 17 on the basis of control programs and the like stored in a ROM 15 and outputs image signals as print data to a printer mechanism (printer engine) 20 connected through a printer interface 19. The CPU 14 can also execute communications with the host computer via an input unit 18, informing the host computer 100 of memory information concerning a RAM 16, resource data, and the like. The RAM 16 is constructed such that the memory

capacity thereof can be extended by an optional RAM connected ot an expansion port.

[0034]

The printer control system also includes at least one card slot (not shown) so that optional font cards and control cards (emulation cards) for different language systems can be connected, in addition to internally stored fonts. Furthermore, the printer control system has an NVRAM (not shown) for storing printer mode set information from the operation panel 1501.

[0035]

In the printer control system with the above arrangement, when the acquiring means (CPU 1) acquires, at a predetermined timing, the printer control language data stored in the memory (ROM 15) of the printer 1500 connected to the host computer through the bidirectional interface 13, the printer control language data acquired by the designating means (CPU 1) is analiged to designate switching between the printer drivers. In accordance with this switching designation, the environment setting means (CPU 1) sets the matching printer driver environment in the host computer 100. Therefore, even if the printer environment of the host computer does not match that of the printer connected to allow communications between them, the matching printer environment is automatically

set.

[0036]

More specifically, when drivers (corresponding to different printers) for a plurality of printer control language systems can be used in the system in which the host computer 100 and the printer 1500 are connected through the bidirectional interface 13, the CPU 1 of the host computer 100 acquires information (such as identification information for specifying a particular printer control language) concerning a printer control language from the ROM 15 of the printer 1500. The CPU 1 then checks matching between the control language systems of the printer driver and the printer on the basis of the acquired information in the work area of the RAM 3 of the host computer 100. If no matching can be obtained, the CPU 1 obtains matching by switching to a printer driver corresponding to the acquired information. Consequently, a user can perform printing by using an appropriate printer driver without performing selection of the printer driver. In this case, the timing at which the information related to the printer control language is acquired is the timing at which the system is initialized (i.e., a power source switch is turned on) or the printing start timing.

[0037]

The printer environmental correspondence

setting processing executed by the printer control system according to the present invention will be described below with reference to Fig. 5.

[0038]

Fig. 5 is a block diagram showing the printer environmental matching setting processing executed between the host computer 100 and the printer 1500 shown in Fig. 4, in which the reference numerals as in Fig. 4 denote the same parts.

[0039]

Referring to Fig. 5, the printer driver file 11a stores various printer drivers PRD1 to PRDN corresponding to drivable printer control languages. The printer driver file 11a is registered in, e.g., the hard disk 11. Therefore, printing can be executed by properly switching the printer drivers PRD1 to PRDN on the basis of the information about the printer control language acquired from the printer.

[0040]

An environment data area 16a for, e.g., a first language system include form (ruled line) data, user font data, RAM data, and the like. Information (e.g., PRCL1) concerning a current printer control language is set in the RAM data. The operation panel 1501 includes keys for setting various modes and keys for recovery from errors. A control card C which is connected when the printer 1500 is to be activated in an emulation

mode is inserted into a card slot S. When this control card C is inserted, "PRCL1" is set in the RAM data.

[0041]

If, however, a plurality of pieces of emulation control information are stored, information related to a corresponding printer control language is set in the RAM data in accordance with selective instructions from, the operation panel 1501.

[0042]

Fig. 6 is a flow chart showing a printer environmental correspondence setting sequence according to the first embodiment of the present invention, in which processing steps S601 to S605 are illustrated.

[0043]

First, in step S601, the CPU 1 designates a printer control language information acquisition request by using a command, as information for asking the printer 1500 the kind of a control language. This designation of the acquisition request is performed when the system is initialized (e.g., when the power source switch is turned on) or when a print start instruction is output. Upon receiving the answer, in step S602, the CPU 1 of the host computer 100 acquires printer control language information from the ROM 15 of the printer 1500. In step S603, it is checked to see whether or not a printer driver currently selected by the host computer 100 matches a control language

currently set in the printer 1500 by referring to the acquired printer control and a plurality of corresponding printer driver information (identification information for specifying the corresponding printer control language and the like) in a work area on the RAM 3.

[0044]

If the control language in the printer 1500 matches the printer driver in the host computer 100 in step S603, the CPU 1 ends the processing; if not, the flow advances to step S604.

[0045]

In step S604, the CPU 1 searches for a printer driver corresponding to the printer control language. If the corresponding printer driver exists, the flow advances to step S605; if not, the CPU 1 ends the processing.

[0046]

In step S605, the CPU 1 designates switching to the corresponding printer driver on the basis of the printer control language information acquired. The matching of the printer driver environment in the host computer is set in accordance with this switching designation, and the processing is ended.

[0047]

As described above, switching between printer drivers is designated on the basis of the printer

control language data (printer control language information) acquired from the memory (in this embodiment, the ROM 15) of the printer 1500 connected to the host computer 100 through the bidirectional interface 13, and the matching of the printer driver environment in the host computer is set in accordance with this switching designation. Therefore, even when the printer environment of the host computer does not match that of the printer connected to allow communications between them, an optimal printer driver can be selected automatically by setting the corresponding printer environment.

[0048]

In this embodiment, the matching between the printer environments is automatically determined by the host computer 100. However, the processing for obtaining the matching between the printer environments can also be automatically activated by a control language switching designation from the operation panel 1501 of the printer 1500 or by detecting the status of insertion and removal of the control card C.

[0049]

In addition, in searching for a combination of a printer driver and a printer control language corresponding to each other, a priority order may be given to a plurality of printer drivers in the host computer 100. Furthermore, the printer control system

of the above embodiment has been described by taking the laser beam printer 1500 as an example, but the present invention is also applicable, of course, to the ink jet printer shown in Figs. 2 and 3 mentioned earlier.

[0050]

In the above embodiment, the matching is set between the printer environments of the printer 1500 and the host computer 100. In this case, to effectively use the memory (RAM 16) of the printer 1500 for each individual printer control language, it is desirable that the entire area of the memory (RAM 16) of the printer 1500 be freed each time the languages are switched. When the memory is freed, however, the contents already registered are erased. For this reason, the control must be performed in a way which sets the contents already registered in the memory with good reproducibility while effectively making use of the memory. This processing will be described below with reference to the second embodiment of the present invention.

[2nd Embodiment]

In the block diagram for explaining the arrangement of the printer control system shown in Fig. 4, when second acquiring means (a CPU 1) acquires first printer environment data stored in a RAM 16 of a printer 1500 on the basis of the printer environmental

switching status, registering means (by processing the function of the CPU 1) registers this first printer environment data acquired in, for example, a hard disk 11 as an internal file of a host computer 100. After this data registration performed by the CPU 1, second printer environment data corresponding to a second printer environment is set in the RAM 16 by environment setting controlling means(by the communication control function between the CPU 1 and a CPU 14), and the first printer environment data, which is registered in the internal file, is also stored again in the RAM 16 by the same function on the basis of the end status of printing conrresponding to the second printer environment. Therefore, even if switching between the printer environments occurs frequently, the contents of printer environment data for each environment can be restored to the RAM 16 with good reproducibility.
[0051]

More specifically, when a plurality of printer control language systems can be used in a system in which the host computer 100 and the printer 1500 are connected through a bidirectional interface 13, in command mode switching from the first printer environment (first language system) to the second printer environment (second language system), the first printer environment data (e.g., registered form data and user font data) is transferred from the RAM 16 of

the printer 1500 to the host computer 100, and the host computer 100 stores the data in a file, such as the hard disk 11. The printer 1500 releases the first printer environment data storage area of the RAM 16 to perform printing corresponding to the second printer environment. Thereafter, when the command mode is to be returned from the second printer environment to the first printer environment, the first printer environment data stored in the host computer 100 is sent to the printer 1500, restoring the status of the printer 1500 before switching to the second printer environment. This makes it possible to effectively use the resource of the memory (RAM 16) of the printer in performing printing corresponding to the second printer environment, and to automatically restore the status of the print environment data in the RAM 16 before printing when the printing is entirely finished.

[0052]

The printer memory resource release processing performed in environmental switching by the printer control system according to the present invention will be described below with reference to Figs. 7 to 9.

[0053]

Fig. 7 is a block diagram for explaining environmental setting switching processing performed between the host computer 100 and the printer 1500, in which the same reference numerals as in Fig. 4 denote

the same parts.

[0054]

Referring to Fig. 7, the environment data storage area 16a for e.g., a first language system consists of form data (ruled line data), user font data, RAM data for storing, e.g., preset items inherent in a printer, and the like. A recording data development area 16b stores bit-map data in printing or is used as a work area. An NVRAM stores printer mode setting information from an operation panel 1501 (to be described later).

[0055]

The operation panel 1501 includes keys for setting various modes and keys for recovery from errors.

[0056]

Fig. 8 is a schematic view showing the memory map of the RAM 16 shown in Fig. 7.

[0057]

Fig. 9 is a flow chart showing an example of an environmental setting switching procedure according to the second embodiment of the present invention, in which processing steps S901 to S906 are illustrated.

[0058]

First, in step S901, the CPU 1 checks whether a change of printer environment data is designated by a keyboard 9 or a pointing device (not shown). If NO in

step S901, the flow advances to step S903 to perform regular printing.

[0059]

If YES in step S901, the flow advances to step S902, and the CPU 1 designates the CPU 14 to send the contents (e.g., the first printer environment data) stored in the printer environment data storage area 16a of the RAM 16 to the host computer 100.

[0060]

In response to this designation, in step S902, the CPU 14 of the printer 1500 reads out the contents from the printer environment data storage area 16a and sends pre-change environment data (e.g., the first printer environment data) to the host computer 100, and the host computer 100 stores the data in an internal file. In step S903, the printer environment data storage area 16a is released so that the printer environment (second printer environment) after the environments are switched can effectively use the memory (RAM 16) maximally, and printing is executed by receiving recording information through known communication processing and performing bit map development. When the print job depending on the printer environment after the switching between the environments is ended in step S904, the CPU 1 checks in step S905 whether the environment data (e.g., the first printer environment data) of the printer 1500 is

registered as an internal file. If NO in step S905, the CPU 1 ends the processing. If YES in step S905, the flow advances to step S906, and the CPU 1 reads out the registered file and transfers the readout file to the CPU 14 of the printer 1500, thereby resetting the printer environment data storage area 16a of the RAM 16 and reproducing and setting the contents of the RAM 16 corresponding to the status (first printer environment) before the environmental switching. Thereafter, the CPU 1 ends the processing.

[0061]

As described above, the first printer environment data stored in the memory (RAM 16) of the printer 1500 which is connected to the host computer 100 through the bidirectional interface 13 is acquired on the basis of the printer environmental switching status and registered as an internal file of the host computer 100. After this registration, the second printer environment data corresponding to the second printer environment is set in the memory of the printer, and the first printer environment data registered in the internal file is stored again on the basis of the end status of printing corresponding to the second printer environment. This allow reliable reproduction of the setting status of the memory for each environment upon switching between printer environments.

[0062]

In addition, since switching between printer environments occurs when printer control language systems are switched, the setting status of the memory for each environment can be reproduced reliably upon switching between the printer control language systems.

[0063]

In the above embodiment, when a request for switching printer control languages is generated by the keyboard 9 or the like of the host computer 100, the printer environment data of the printer 1500 is read out by the host computer 100 and registered as a temporary file. As shown in Fig. 10, however, the system may also be arranged such that when a switching designation is applied from the operation panel 1501 of the printer 1500, a current printer environment is transferred to the host computer 100 and registered as separate registered files 3-1 to 3-3 in the RAM 3 or the hard disk 11. In this case, in accordance with a registered file call from the printer 1500, the separate registered files 3-1 to 3-3 are sent back to the printer 1500 in the order of registration and reproduced in the printer environment data storage area 16a of the RAM 16.

[0064]

Furthermore, in the above embodiment, the occurrence of switching between printer control

language systems in the single host computer 100 is used as the printer setting change condition. The present invention, however, is also applicable to a system shared by a plurality of host computers and a plurality of printers. Alternatively, a designation made from the operation panel 1501 by a user may be used as the switching condition. The system may also be arranged such that a plurality of environmental mode set files are set to be usable by the same user and desired printer set information is reproduced in the printer environment data storage area 16a of the RAM 16 by using a designation for calling a desired environmental mode set file as the switching condition. Note that the printer control system of the above embodiment has been described by taking the laser beam printer 1500 as an example, but the present invention is, of course, applicable to the above-mentioned ink jet printer shown in Figs. 2 and 3 and the like.

[0065]

[Technical Advantages]

As has been described above, according to the first printer controlling method of the present invention, the printer controlling language data stored in the memory of the printer which is connected to the host computor via the bidirectional interface is acquired, the switching of the printer drivers is designated based on the printer controlling language

data thus acquired, and the printer driver environment of the host computor is conformably set in accordance with the switching designation, so that even if the printer environments of the printer connected communicably and of the host computor do not conform with each other, the conformable printer environments can be set to automatically select the optimum printer driver.

[0066]

According to the first printer controlling system of the present invention, when the first acquiring means acquires the printer controlling language data stored in the memory of the printer connected to the host computor via the bidirectional interface at the predetermined timing, the designating means analizes the printer controlling language data acquired by the acquiring means to designate the switching of the printer drivers, and the environment setting controlling means conformably sets the printer driver environment of the host computor in accordance with the switching designation, so that even if the printer environments of the printer which is connected communicably and of the host computor do not conform with each other, the conformable printer environments can be automatically set.

[0067]

In the second printer controlling method

according to the present invention, as has been described above, the first printer environment data stored in the memory of the printer connected to the host computer through the bidirectional interface is acquired on the basis of the printer environmental switching status and registered as an internal file of the host computer. After this registration, the second printer environment data corresponding to the second printer environment is set in the memory of the printer, and the first printer environment data registered in the internal file is stored again in the memory of the printer on the basis of the end status of printing corresponding to the second printer environment. This makes it possible to reliably reproduce the setting status of the memory for each environment upon switching between the printer environments.

[0068]

In addition, the system is arranged such that the switching between printer environments occurs when printer control language systems are switched, so the setting status of the memory of the printer for each environment can be reproduced reliably upon switching between the printer control language systems.

[0069]

According to the second printer controlling system of the present invention, when the second

acquiring means acquires the first printer environment data stored in the memory of the printer based on the printer environment switching state, the registering means registeres the first printer environment data thus acquired in the internal file of the host computor, and the environment setting controlling means sets the second printer environment data corresponding to the second printer environment in the memory and recovers and sets the first printer environment data registered in the internal file in the memory based on the printing process termination state at the completion of the data registration by the registering means, so that even if the printer environments are frequently switched, the data content in the memory of the printer in each environment can be recovered and set with high reproducibility.

[0070]

Even when, therefore, the host computer is connectable to a plurality of printers having different control language systems and the printer environment of the host computer does not match that of the printer connected to allow communications between them, the matching printer environments can be set automatically. This makes it possible to obtain correct printing results free from recording errors even if an operator has failed to set the printer environment.

Furthermore, the printer setting information depending

on a desired printer environment resident in a limited memory is resettable by the host comuper. Therefore, a maximum memory area of the printer can be allocated to the printer control language system after printer environments are switched, resulting in highly efficient printing.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Figure 1]

A sectional view showing the arrangement of a first recording apparatus to which the present invention is applicable.

[Figure 2]

A perspective view showing the outer appearance of a second recording apparatus to which the present invention is applicable.

[Figure 3]

A block diagram for explaining the control system of the second recording apparatus shown in Fig. 2.

[Figure 4]

A block diagram for explaining the arrangement of a printer control system according to the first embodiment of the present invention.

[Figure 5]

A block diagram for explaining environmental setting switching processing executed between a host

computer and a printer shown in Fig. 4.

[Figure 6]

A flow chart showing an example of an environmental setting switching procedure according to the first embodiment of the present invention.

[Figure 7]

A block diagram for explaining the environmental setting switching processing executed between the host computer and the printer shown in Fig. 4.

[Figure 8]

A schematic diagram showing the memory map of a RAM shown in Fig. 7.

[Figure 9]

A flow chart showing a environmental setting switching sequence according to the second embodiment of the present invention.

[Figure 10]

A block diagram for explaining another environmental setting switching processing executed between the host computer and the printer shown in Fig. 4.

[Description of Reference Numerals of Symbols]

1 ... CPU

2 ... ROM

3 ... RAM

14 ... CPU

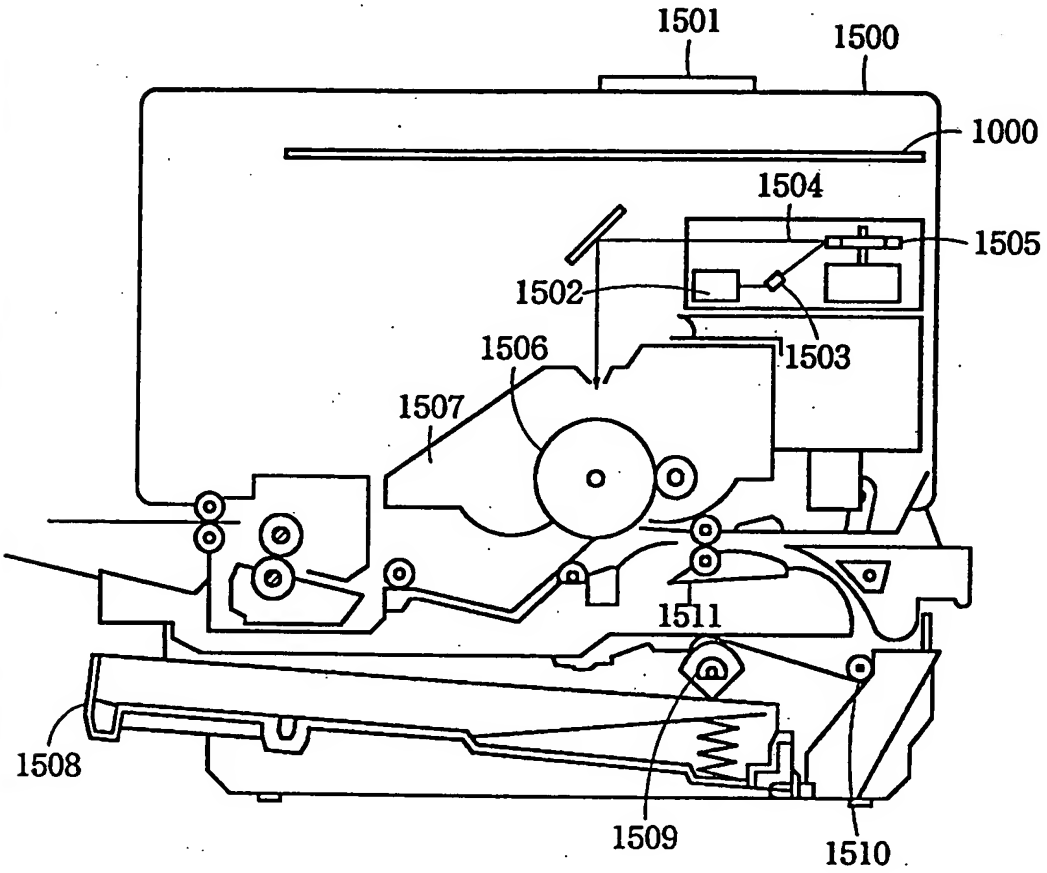
15 ... ROM

16 ... RAM

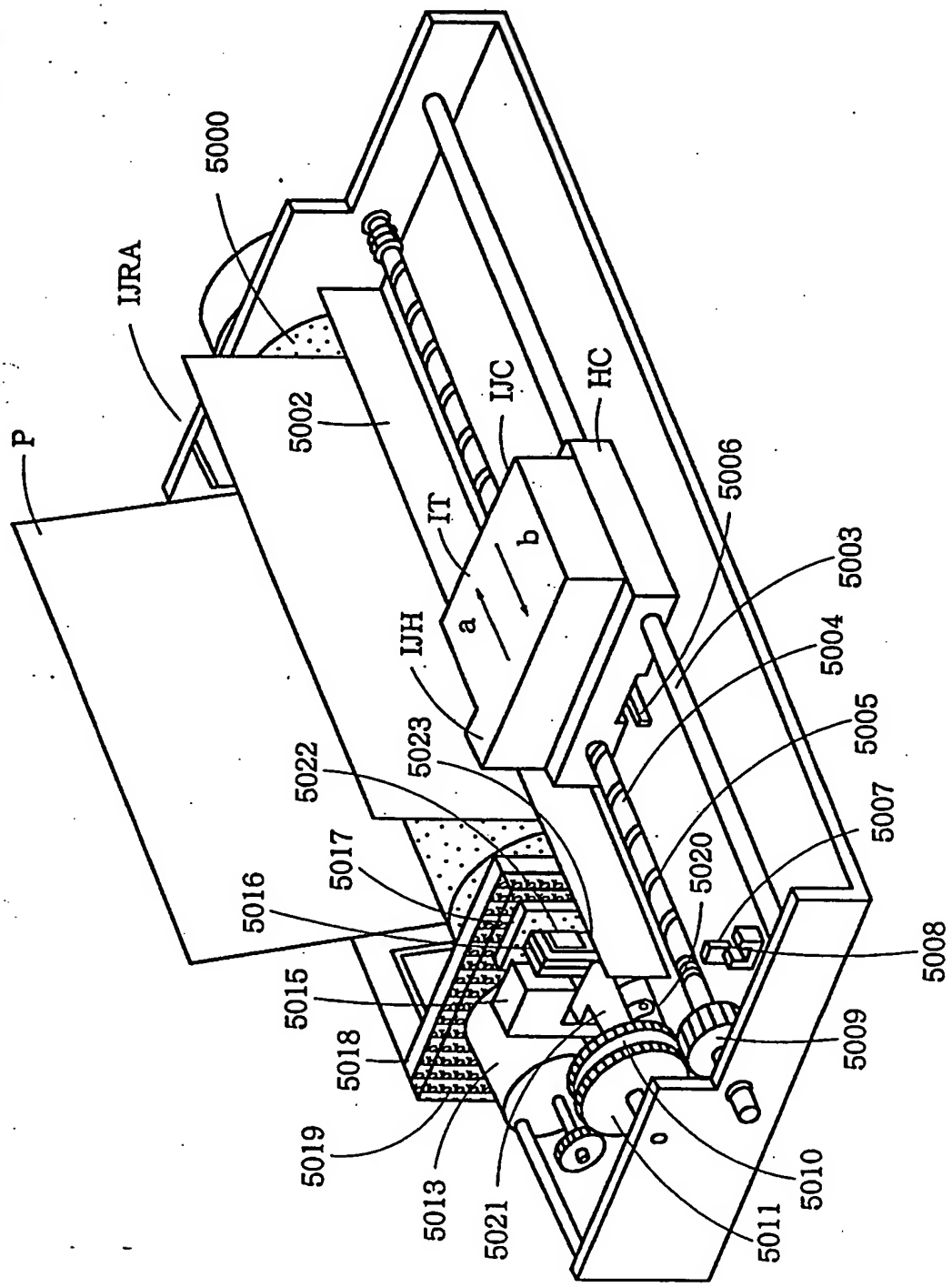
100 ... host computor

1500 ... printer

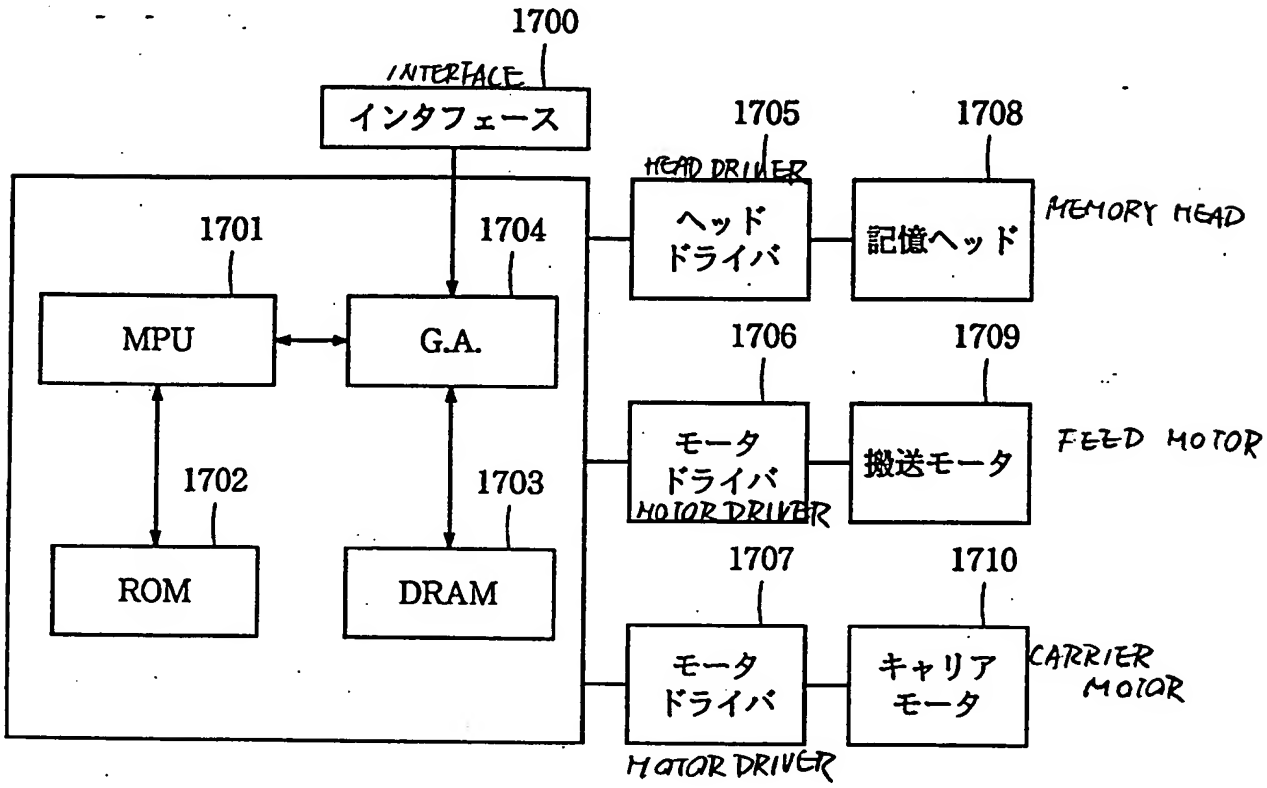
【書類名】　図面
[Name of the Document] Drawing
【図１】
Fig. 1



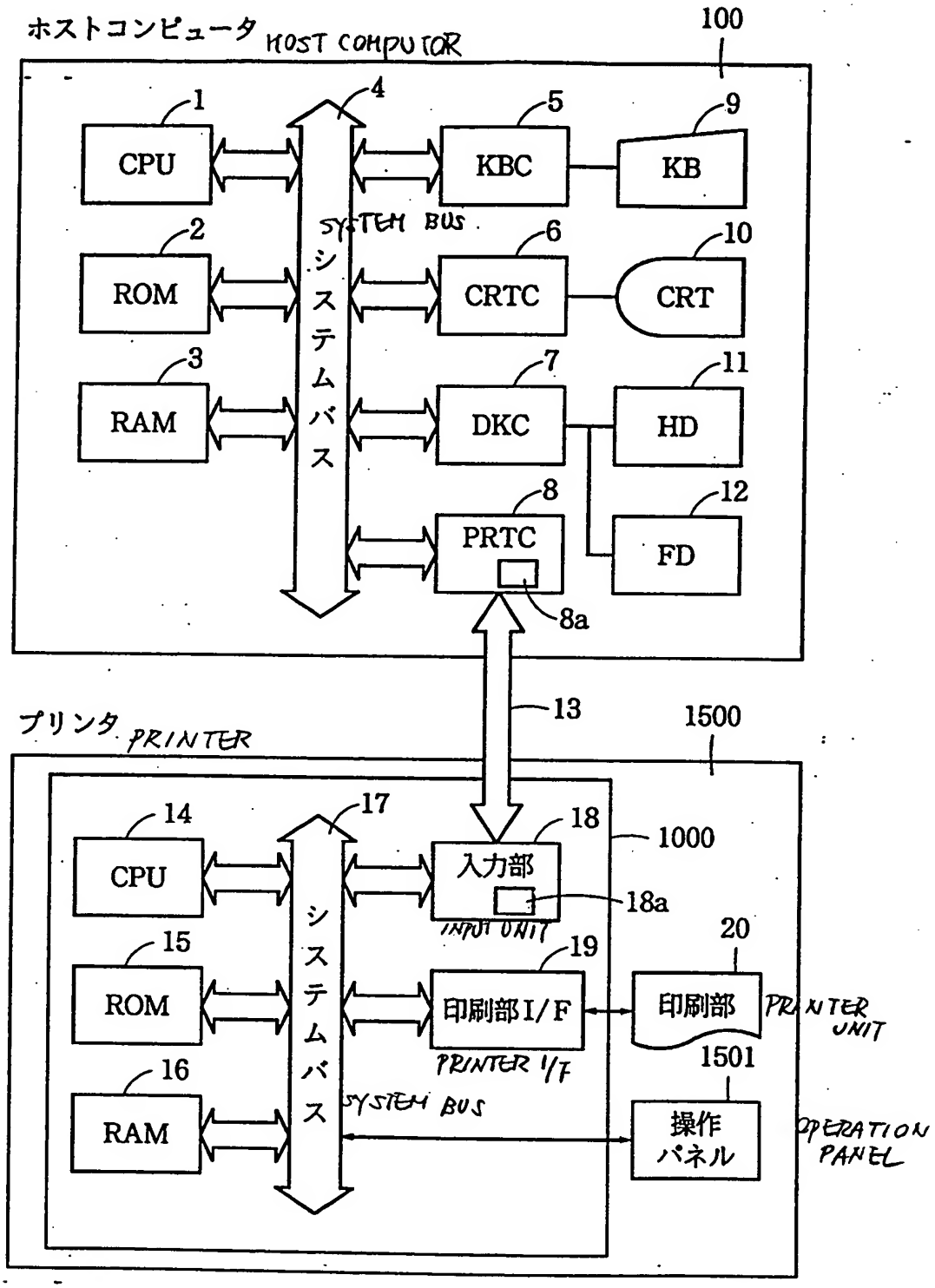
【図2】 Fig.2


5000
IJRA
P
5002
IJC
HC
IT
a
b
IJH
5006
5003
5004
5005
5023
5022
5007
5017
5020
5016
5008
5015
5009
5018
5019
5010
5013
5021
5011

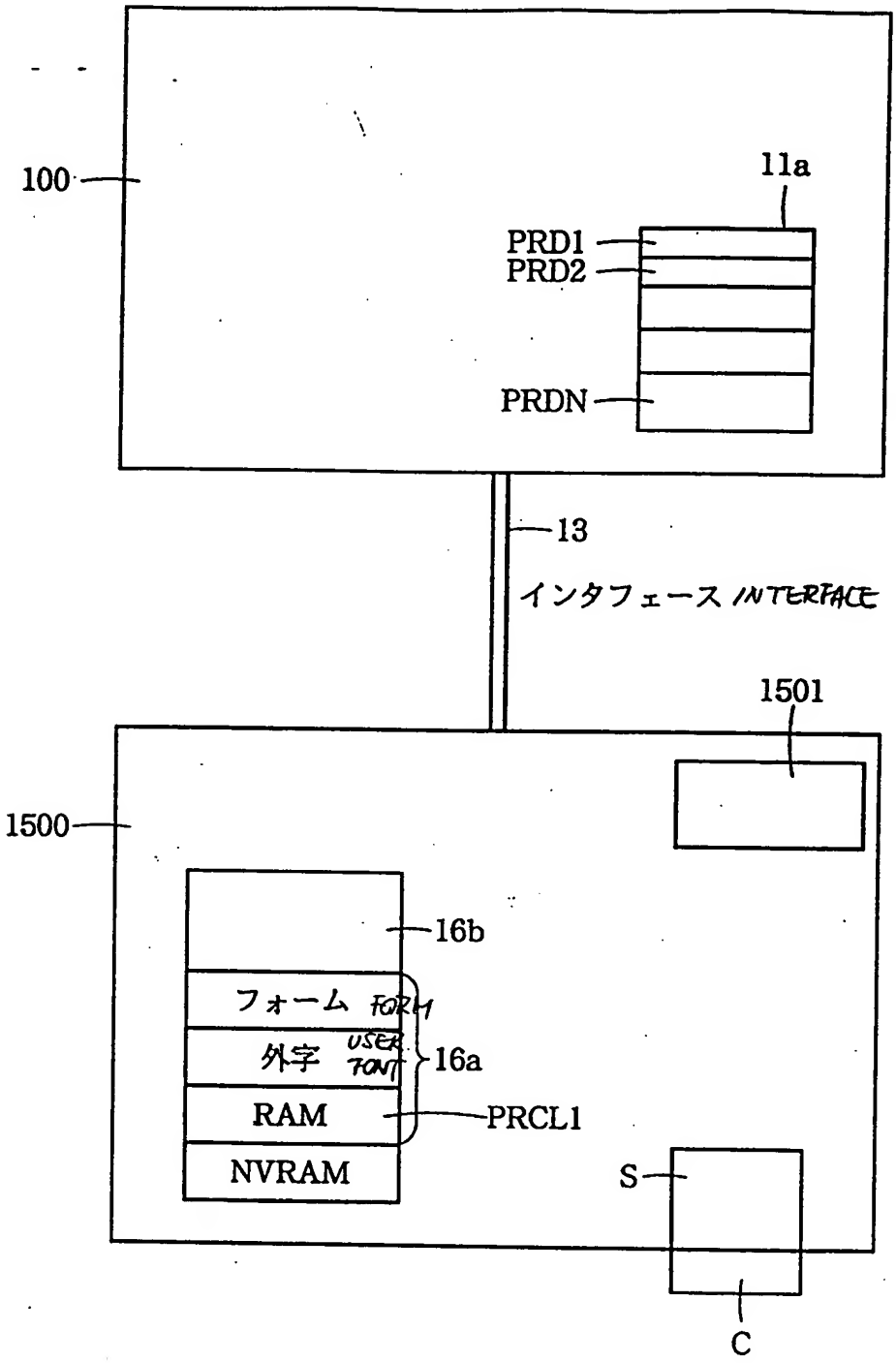
【図３】　Fig.3


1700
INTERFACE
インタフェース
1705
HEAD DRIVER
1708
ヘッド
ドライバ
記憶ヘッド
MEMORY HEAD
1701
1704
MPU
G.A.
1706
1709
モータ
ドライバ
MOTOR DRIVER
搬送モータ
FEED MOTOR
1702
1703
ROM
DRAM
1707
1710
モータ
ドライバ
MOTOR DRIVER
キャリア
モータ
CARRIER
MOTOR

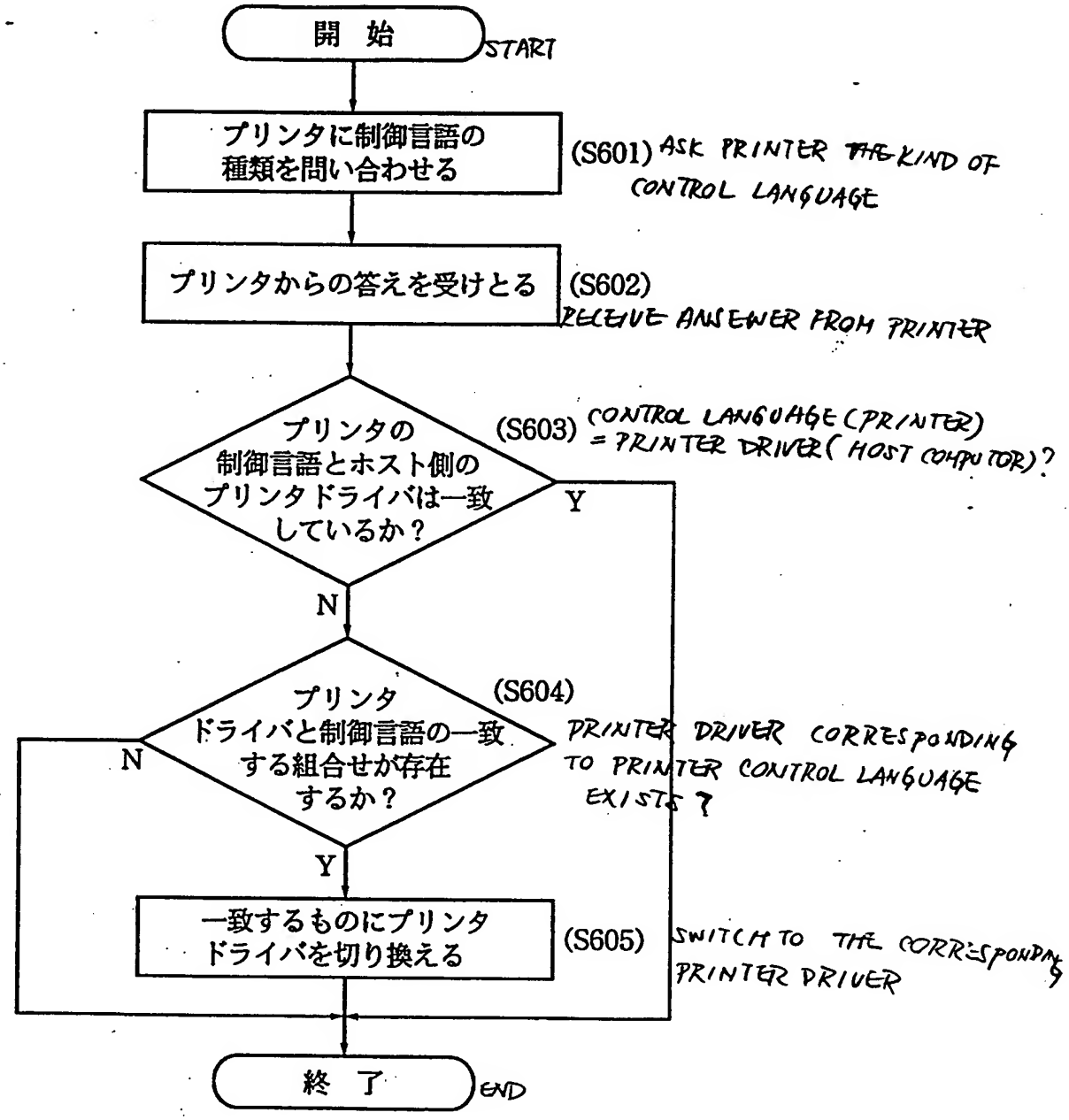
【図４】 Fig.4


ホストコンピュータ HOST COMPUTER
100
CPU
1
ROM
2
RAM
3
4
システムバス
SYSTEM BUS
KBC
5
CRTC
6
DKC
7
PRTC
8
8a
KB
9
CRT
10
HD
11
FD
12
13
プリンタ PRINTER
1500
14
CPU
15
ROM
16
RAM
17
システムバス
SYSTEM BUS
18
入力部
INPUT UNIT
18a
1000
19
印刷部I/F
PRINTER I/F
20
印刷部
PRINTER UNIT
1501
操作パネル
OPERATION PANEL

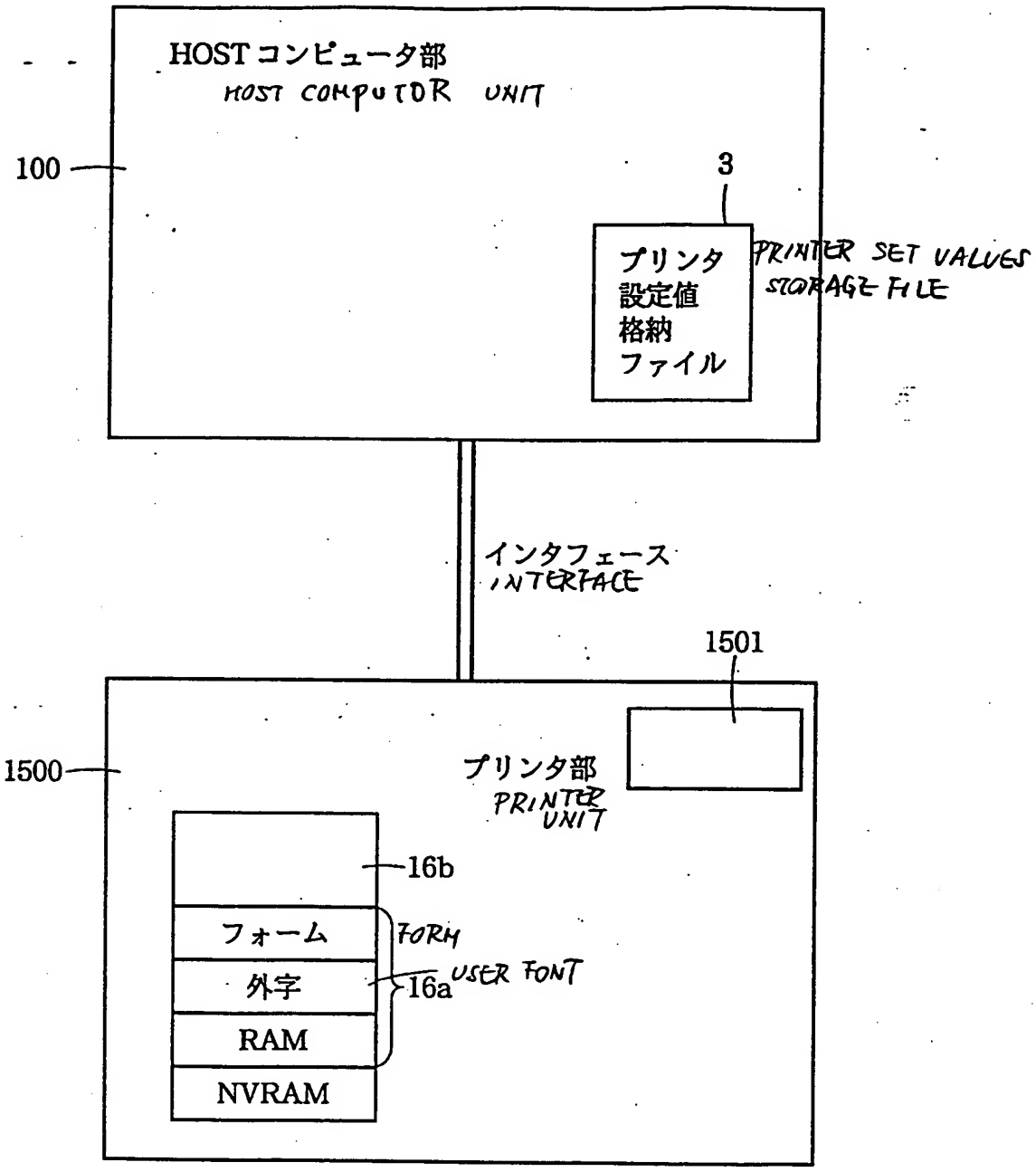
【図５】　Fig.5


100
11a
PRD1
PRD2
PRDN
13
インタフェース INTERFACE
1501
1500
16b
フォーム FORM
外字 USER FONT
16a
RAM
PRCL1
NVRAM
S
C

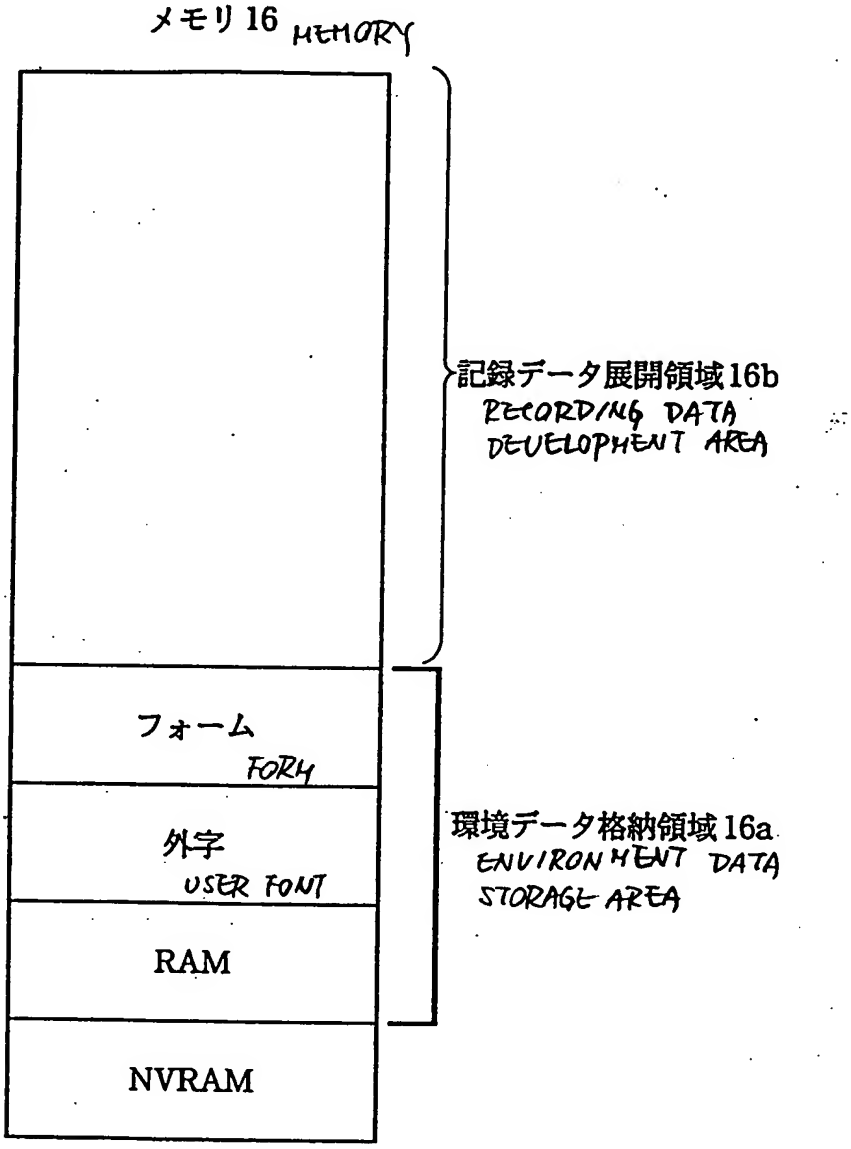
【図６】　Fig. 6


開　始
START
プリンタに制御言語の種類を問い合わせる
(S601) ASK PRINTER THE KIND OF CONTROL LANGUAGE
プリンタからの答えを受けとる
(S602) RECEIVE ANSWER FROM PRINTER
プリンタの制御言語とホスト側のプリンタドライバは一致しているか？
(S603) CONTROL LANGUAGE (PRINTER) = PRINTER DRIVER (HOST COMPUTOR)?
Y
N
プリンタドライバと制御言語の一致する組合せが存在するか？
(S604) PRINTER DRIVER CORRESPONDING TO PRINTER CONTROL LANGUAGE EXISTS?
N
Y
一致するものにプリンタドライバを切り換える
(S605) SWITCH TO THE CORRESPONDING PRINTER DRIVER
終　了
END

【図７】　Fig.7

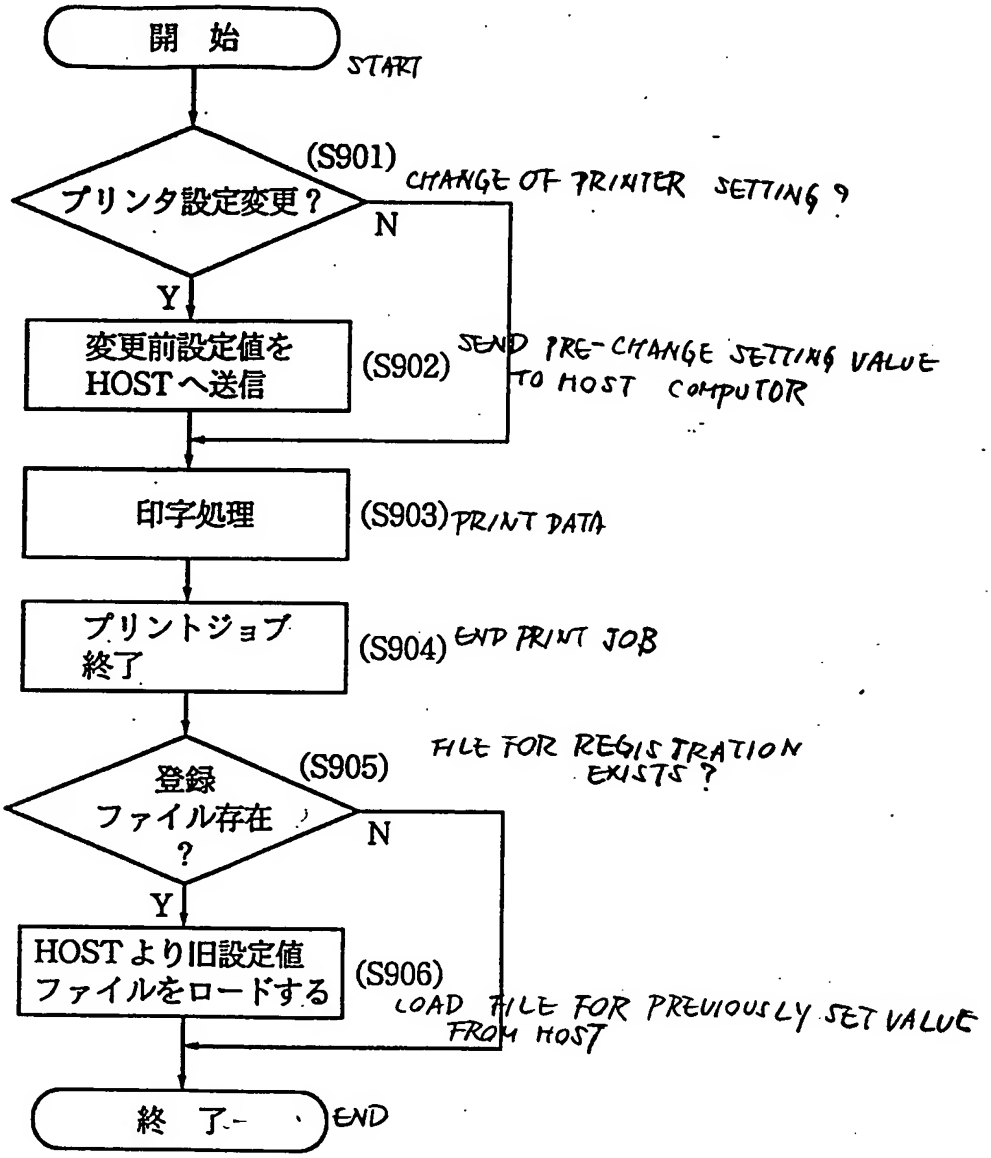

HOSTコンピュータ部
HOST COMPUTOR UNIT
100
3
プリンタ設定値格納ファイル
PRINTER SET VALUES STORAGE FILE
インタフェース
INTERFACE
1501
1500
プリンタ部
PRINTER UNIT
16b
フォーム
FORM
外字
16a
USER FONT
RAM
NVRAM

【図８】 Fig.8

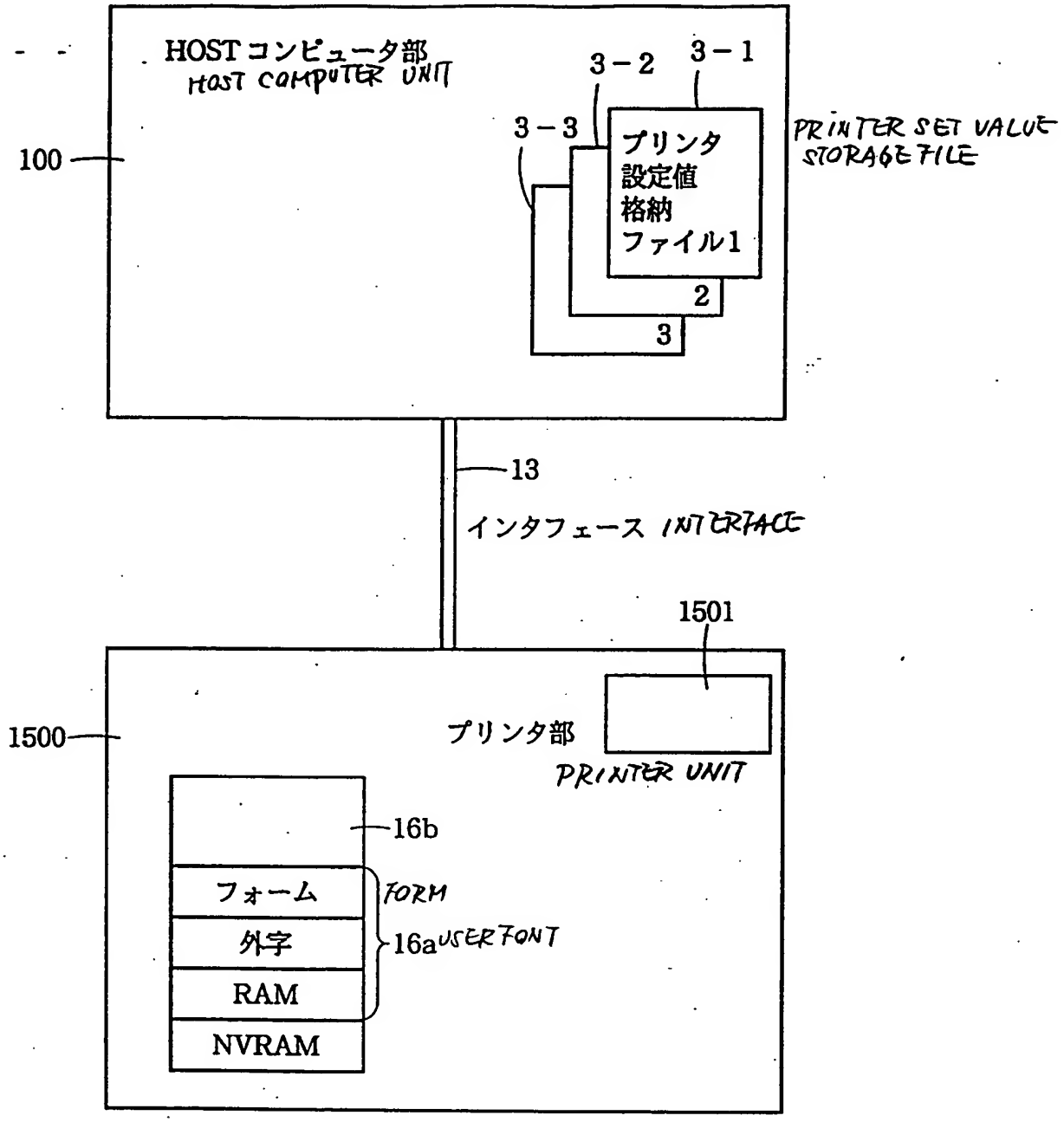

メモリ16 MEMORY
記録データ展開領域16b
RECORDING DATA
DEVELOPMENT AREA
フォーム
FORM
外字
USER FONT
RAM
NVRAM
環境データ格納領域16a
ENVIRONMENT DATA
STORAGE AREA

【図９】

Fig.9


開　始
START
(S901)
プリンタ設定変更？
CHANGE OF PRINTER SETTING ?
N
Y
変更前設定値を
HOSTへ送信
(S902)
SEND PRE-CHANGE SETTING VALUE TO HOST COMPUTOR
印字処理
(S903) PRINT DATA
プリントジョブ
終了
(S904) END PRINT JOB
登録
ファイル存在
？
(S905)
FILE FOR REGISTRATION EXISTS ?
N
Y
HOSTより旧設定値
ファイルをロードする
(S906)
LOAD FILE FOR PREVIOUSLY SET VALUE FROM HOST
終　了
END

【図１０】　Fig.10


HOSTコンピュータ部
HOST COMPUTER UNIT
100
3－1
3－2
3－3
プリンタ
設定値
格納
ファイル1
2
3
PRINTER SET VALUE
STORAGE FILE
13
インタフェース INTERFACE
1501
1500
プリンタ部
PRINTER UNIT
16b
フォーム
外字
RAM
NVRAM
FORM
16a USER FONT

[NAME OF THE DOCUMENT] Abstract

[Abstract]

[Object]

An object of the present invention is to automatically set printer environments of a host computor and of a printer which can be connected thereto so as to be well conformable with each other.

[Structure]

The constitution of the present invention is characterized in that printer controlling language data which is stored in a memory of a printer which is connected to a host computor via a bidirectional interface is acquired, switching of printer drivers is designated based on the printer controlling language data thus acquired and a printer driver environment of the host computor is conformably set in accordance with the switching designation.

[Elected Drawing] Figure 6

4-186357

[Name of the Document] Authorized Correction Data

[Document to be corrected] Patent Application

<Recognition Information • Additional Information>

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(Reason for Change) New Registration

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